Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

surgery that was converted to an open operation, more infections if they received shorter antibiotic courses. For such patients, more caution might be needed as longer courses could be protective.

Adoption of this approach in low-income settings needs careful consideration. Compared with high-income settings, presentation of patients to surgeons tends to take longer, laparoscopic surgery is less commonly available, training is different, and open surgery is more often required for advanced disease, corresponding to higher mortality in low-income and middle-income countries.[4,5] Under these circumstances, routine shorter courses of postoperative antibiotics should be used cautiously.

The perfect surgical trial does not exist.[6] The relatively high losses to follow-up were equal across trial arms, which should reduce the chance of bias. Follow-up was primarily conducted using electronic patient records, in which some events might not be recorded, introducing the potential for detection and recall bias. The operative laparoscopic procedure did not seem to be standardised and variation in practices could have affected infection rates.[7,8]

Like most trials, APPIC did not report ethnicity data. Such data remain extremely challenging to collect, as current classification systems are inadequate and approval to collect such data is challenging to obtain. Information on ethnicity alone is inadequate and will produce biased findings, as there is likely to be a key interplay between migration and socioeconomic status. In some settings, collecting ethnicity data is not culturally or legally appropriate at present.

Much pragmatic research needs to be done on appendicitis. Definitions of complex and non-complex disease vary, making comparisons between trials more difficult. For example, the APPIC trial classified phlegmonous appendicitis as simple appendicitis, whereas other studies have classified it as complex. More research to further shorten postoperative antibiotic courses (eg, to one dose rather than 2 days of antibiotics) would be a logical next step. A whole body of research is necessary for health systems in low-income and middle-income countries, including to understand challenges around access and diagnosis, implementing sustainable laparoscopic capacity, and identifying the optimum context-specific antibiotic strategies. Although the outcomes of laparoscopic appendicectomy in high-income countries are well defined, a randomised trial of implementing laparoscopic surgery in low-income and middle-income settings is justified. Minimising time in hospital and unnecessary medication use will reduce the carbon footprint of this very common condition.

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Stopping epidemics when and where they occur

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Throughout the COVID-19 pandemic, vaccines and other health tools have reached lower-income countries out-of-step with need and demand.[1–3] Yet lessons from this pandemic to address such inequities are not catalysing the fundamental changes required.[4] Similarly, despite the well known risk of Ebola virus disease outbreaks, it took months before candidate vaccines were made available for testing during an outbreak in Uganda in late 2022.[5] And although there have been cases of mpox (formerly known as monkeypox) in Nigeria, the

Democratic Republic of the Congo, and Central African Republic for many years, it was only when the virus spread globally during 2022 that high-income countries focused on the disease, with people in wealthy countries getting access to mpox vaccines and therapies.[6]

Governments and the global community must urgently tackle difficult questions about why, how, where, and when diagnostics, treatments, and vaccines are produced, and about who is in control of their availability and distribution. Epidemics present unique and complex scientific, health, socioeconomic, and international cooperation challenges that require a fit-for-purpose response.[7] Current market forces cannot provide the tools to stop disease outbreaks. We propose a new framework that is designed in the public interest and rooted in equity from start to finish to create a sustainable ecosystem for medical countermeasures to outbreaks, based on the sharing of knowledge and technology and governed and financed through a global commons approach (panel).

This conversation and some actions are already under way. Hard lessons from the Access to COVID-19 Tools Accelerator (ACT-A), which despite efforts failed to reach targets, are spurring discussions.[8] WHO's mRNA vaccine technology transfer hub in South Africa and other related initiatives in Africa, Asia, and Latin America, offer promise.[9,10] Public–private partnerships are building vaccine manufacturing capacity in some lower-income countries. But these efforts, without innovative approaches linked to governance and finance, will not produce the equitable start-to-finish or "end-to-end platform" that encompasses every stage from research and development to manufacturing, distribution, and access, recommended by the Independent Panel for Pandemic Preparedness and Response in its May, 2021 report and demanded now on many continents.[11,12]

The most promising opportunity lies with research and development efforts that allow scientists to rapidly create new medical countermeasures on the basis of existing technologies, as was done successfully for COVID-19 vaccines, treatments, and testing.[13-16] Enabling scientists in every region to build on existing knowledge and promptly adapt technologies to respond to epidemics when and where they occur could be transformational. Given the limitations of current market-based incentives and of donor-to-recipient aid models, we have considered how to deliver appropriate health technologies and equitable access where and when they are needed.[12] As part of a new framework for a global commons approach to stop epidemics, we propose six essential building blocks to create an equitable end-to-end ecosystem for medical countermeasures (panel).

***Panel*: Visions, values, aims, and six essential building blocks of a new framework for a global commons approach to stop epidemics**

Vision and values of the new framework for effective health innovation

- Health technologies for PPR should be considered common goods, not private commodities
- A new business model is needed to deliver common goods for PPR
- Collective intelligence and technology sharing are the most effective ways to deliver innovation for public health
- A true end-to-end approach to medical innovation is rooted in equity at every step
- Appropriate health technologies are those that ensure the right outcome for health
- Structuring partnerships with the private sector towards shared public health goals

Aims of the new equitable global commons approach

- Timely development of appropriate health technologies for epidemic preparedness and response that are fit-for-purpose in all countries in need and in various health settings
- Timely and equitable availability, with access to technologies when and where they are needed
- Equipping and supporting countries to use these technologies to address their health needs
- Mechanisms to facilitate innovation to adapt to the evolving needs and demands of pandemic control

Six essential building blocks for an effective PPR innovation ecosystem

- Regional research and development hubs built around ready-to-adapt technology platforms for "last-mile innovation"
- Pre-negotiated financing and governance for research, development, and manufacturing, including ownership rules over technologies and commitments for availability and access following a common good approach
- Ready-to-use clinical trial networks, conducting public-health-focused trials
- Ready-to-activate regional and subregional manufacturing capacity linked to the selected technology platforms
- Continuous assessment of health needs to inform and guide the priority research and development agenda
- Coordinated allocation and supply management that ensures equity at regional and subregional levels

PPR=pandemic prevention, preparedness, and response.

The first and central building block is the establishment of regional research and development hubs built around existing technologies for the development of diagnostics, vaccines, and therapies, such as mRNA vaccines, viral vectors, or monoclonal antibodies. When scientists everywhere, working in the public interest, have the expertise and capacity to work with these technologies without intellectual property restraints, they can promptly develop new tools to address local disease outbreaks.[9] These hubs would be based on collective intelligence and technology sharing, foster equity in research and development capability, and reduce reliance on goodwill for voluntary licensing.[17–19] The WHO-supported mRNA vaccine technology transfer hub is a first step but needs to be taken further with more hubs and additional types of vaccine technologies.

The second building block is a pre-negotiated governance and financing framework, to be agreed through a mandated mechanism decided by the international community, that would promote a common good approach to the development and distribution of health tools. Common goods are shared resources that people manage or govern collectively in the public interest by negotiating specific rules, such as user and access rights and obligations. Governance and financing should be established in advance to include the legal, policy, and institutional frameworks to organise ownership arrangements for the common good,[20,21] including agreements on intellectual property of existing technologies, technology sharing, and knowledge transfers. These issues will be challenging, but there is both a moral imperative and national self-interest to work through them, given the global devastation pandemics such as COVID-19 can cause.

The third building block is ready-to-use clinical trial networks linked to the research and development hubs that undertake trials focused on products that will protect people and stop disease outbreaks. Health authorities, rather than companies developing products for marketing, should steer and shape which type of products are developed for outbreak control and which public health questions trials seek to answer, including on efficacy, safety, and comparative effectiveness. Several such public-health-oriented trial networks already exist.[22]

The fourth building block is ready-to-activate decentralised regional and subregional manufacturing capacity linked to the selected technology platforms. Such manufacturing facilities need to engage in routine production and be able to switch to manufacture a different product or scale up rapidly in an outbreak emergency. Manufacturing capacity in China, Europe, India, Russia, and the USA made all the difference to access to COVID-19 vaccines in those regions. The same should also happen in Africa, Latin America, and more broadly across Asia through sharing of technology and know-how to build greater manufacturing autonomy and resilience, not only manufacture under licence. Medical countermeasures must be manufactured locally so they can be distributed rapidly to the communities that need them. Here too, initiatives to build local manufacturing capacity have begun.[23] However, true expansion of manufacturing capacity for public health must go beyond private companies' building sites to produce proprietary vaccines.

The fifth building block is continuous assessment of health needs and emerging threats to inform and guide a priority research and development agenda, including products that are tailored to local contexts, such as for heat stability or ease of production. This approach includes ongoing assessments as threats evolve, such as characterising different viral strains and diversifying technologies to tackle epidemics more effectively, for instance by developing vaccines that block transmission.

The sixth building block is an inclusive, transparent, and accountable system for coordinated governance of allocation of supply and supply management to ensure equity in access to medical countermeasures, delivering products to regions and localities where there are priority needs.

These six building blocks are inter-related and together form an equitable end-to-end ecosystem for outbreak and pandemic tools. There are various scenarios to operationalise the six building blocks and we assume that different regions and countries may choose to organise ownership and control of the research and design of new outbreak tools according to local contexts. We highlight here three possible scenarios for end-to-end health innovation for an effective pandemic prevention, preparedness, and response ecosystem. The three scenarios are not mutually exclusive and can be combined depending on regional needs and preferences.

The first scenario involves pre-negotiated public–private partnerships. Both ACT-A and the Coalition for Epidemic

Preparedness Innovation (CEPI) are examples of public–private partnerships and offer one clear option. However, these models have fallen short in sharing technologies and building the autonomy, capacity, and resilience demanded by many in the Global South.[24] To attain their public health objectives, these partnerships should build common good principles into their design, including clear conditions on pricing, equitable access, intellectual property, and profit sharing that private partners must meet to receive public funds or other benefits.[25] Although the implementation had its challenges, the original intentions of the licensing of the University of Oxford ChAdOx1 nCoV-19 vaccine to AstraZeneca and then to the Serum Institute of India is such an example.[26]

A second scenario involves the creation of a dedicated public research and development infrastructure with pooled financing for epidemic response. This could be a structure within the UN system or it could be set up as global or regional networks of research centres, such as the Consultative Group on International Agricultural Research[27] or CERN, the European Organization for Nuclear Research.[28] Health technologies could then be developed outside the commercial realm and produced at cost for delivery to public health systems.

A third scenario involves regional hubs with shared technology platforms. This scenario is perhaps the most transformative and would consist of public or public and private networks with a core feature of sharing technologies and manufacturing know-how regionally and nationally in the public interest. In this scenario, national and regional hubs would have access to key technologies for diagnostics, treatments, and vaccines that can be adapted to respond to multiple pathogens, with equity built in from the research phase and approached through a common good lens. The WHO mRNA vaccine technology transfer hub in South Africa and its network of producers in 15 countries could serve as a pilot for a broader network of epidemic preparedness and response research and development hubs that encompass a diversity of technologies.[9] The openly shared development of the COVID-19 vaccine Corbevax is another example.[29]

Where elements of these technologies are under private sector control through patents and trade secrets, the international community could, for example, collectively buy them out as part of the public interest, as suggested by the economist and Nobel laureate Michael Kremer and recently proposed in the context of COVID-19 vaccines.[30,31] Moving forward, conditions should be attached to public investments in research and development so that its results and outcomes are made global commons from the start. Both ideas have also been proposed as elements for a pandemic accord.[32]

The status quo is no longer an option. A new pandemic accord must lay the basis for an end-to-end system grounded in equity, regional resilience, and a common good approach. A political declaration from the upcoming UN General Assembly high-level meeting for pandemic prevention, preparedness, and response to be held before the end of September, 2023 should do the same. It is past time for governments and all stakeholders to define a clear path forward and create a truly equitable ecosystem for pandemic countermeasures.[33] In this evermore interconnected world, the duty of governments and the international system to control outbreaks and avert costly pandemics requires solutions that protect everyone.

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Partnering to deliver sustainable children's surgical care in Kakuma refugee camp

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The devastating milestone of 100 million people globally forced to flee their homes because of war, violence, persecution, and discrimination was reached on May 23, 2022.[1] Women and children are disproportionately affected. 42% of forcibly displaced people worldwide are children.[2] In Kenya, by September, 2021, 76% of registered refugees and asylum seekers were women and children.[3] These women and children have considerable negative health consequences with increased rates of morbidity and mortality compared with non-displaced populations.[4,5]